Type 3374 Electric Actuator

Version with positioner, revision 2

Mounting and Operating Instructions

EB 8331-4 EN

Firmware version 2.04

Edition April 2014

Definition of signal words

DANGER!
Hazardous situations which, if not avoided, will result in death or serious injury

WARNING!
Hazardous situations which, if not avoided, could result in death or serious injury

NOTICE
Property damage message or malfunction

Note:
Additional information

Tip:
Recommended action

1 General safety instructions 7

2 Design and principle of operation 8

2.1 Versions 8

2.2 Limit contacts 8

2.2.1 Mechanical limit contacts 8

2.2.2 Electronic limit contacts 8

2.3 Technical data 9

3 Installation 12

3.1 Mounting position 12

3.2 Attachment to valve 13

3.2.1 Construction with integrated yoke 13

3.2.2 Construction with ring nut 13

4 Electrical connections 15

5 Putting the actuator into operation 16

6 Manual override 16

6.1 Mechanical override (only actuators without fail-safe action) 16

6.2 Moving the actuator stem manually 16

7 Mechanical limit contacts 17

7.1 Installing the limit contacts 17

7.2 Adjusting the limit contacts 20

8 Electronic limit contacts 20

8.1 Installing the limit contacts 20

8.2 Adjusting the limit contacts 21

9 Dimensions in mm 21

10 Operating controls 22

10.1 Display 23

10.2 Rotary pushbutton 25

10.2.1 Menu control 25

10.3 Serial interface 26

11 Key number 27

11.1 Customized key number 28

12 Operating level 29
12.1 Selecting operating mode 29
12.2 Adapting the display 30
12.2.1 Reading direction 30
12.2.2 Backlight 30
12.3 Initializing the actuator 31
12.4 Reading errors 32
12.5 Applications 33
12.5.1 Positioner 33
12.5.2 PID controller 33
12.5.3 Two-step mode 34
13 Configuration level 35
13.1 Activating and setting parameters 35
13.2 Input signal 36
13.3 Operating direction 37
13.4 End position guiding 38
13.4.1 Operating direction increasing/increasing 38
13.4.2 Operating direction increasing/decreasing 38
13.5 Position feedback signal 39
13.6 Binary input 40
13.7 Binary output 41
13.8 Electronic limit contacts 42
13.9 Restart 42
13.10 Blockage 43
13.11 Travel 44
13.12 Characteristic 45
14 Information level 47
14.1 Activating parameters 47
15 Diagnostic level 48
15.1 Activating and setting parameters 48
15.2 Troubleshooting 49
15.3 Start zero calibration 50

15.4 Start initialization....50
15.5 Restarting the actuator (reset)....50
15.6 Loading default settings....51
15.7 Testing the display....51
15.8 Measuring the transit time....52
16 Memory pen....53
16.1 Command pen....54
17 Appendix....56
17.1 Levels and customer data....56
17.1.1 Operating level....56
17.1.2 Configuration level....57
17.1.3 Information level....62
17.1.4 Diagnostic level....63
17.1.5 Further codes on the display....64
17.2 Nameplate....65
17.3 Customer inquiries....65
17.4 Replacing the display....66
Index....72

Firmware revisions	
Old	**New**
2.02	**2.03**
	Internal revisions
2.03	**2.04**
	Code c11 (Exit manual level for travel adjustment) indicated by MEND (previously MANU) Memory pen with dialog "No initialization performed" is indicated by RUNT and E00 error (previously NRUN, E15) IN/OUT reading for two-step mode

1 General safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the actuator:

– The actuator is to be mounted, started up or operated only by trained and experienced personnel familiar with the product. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
– Any hazards that could be caused in the valve by the process medium and the operating pressure or by moving parts are to be prevented by taking appropriate precautions.
– The actuator is designed for use in low voltage installations. For wiring and maintenance, you are required to observe the relevant safety regulations. Only use protective equipment in which the power supply cannot be reconnected inadvertently.
– Before wiring the actuator, disconnect it from the power supply.

To avoid damage to any equipment, the following also applies:

– Proper shipping and storage are assumed.

Note:
Devices with a CE marking fulfill the requirements of the Directives 2004/108/EC and 2006/95/EC.
The Declaration of Conformity is available on request.

2 Design and principle of operation

The Type 3374 Electric Actuator is used in industrial plants as well as in heating, ventilation and air-conditioning systems.
The actuator is suitable for form-fit attachment to various SAMSON valve series, and **with or without fail-safe action** depending on the version.
The stepper motor is switched off by torque-dependent switches in the end positions or in case of overload. The force of the motor is transmitted to the actuator stem via gearing and ball screw.

Note:
On replacing a Type 3374 Actuator (revision 1) with a Type 3374 Actuator (revision 2), the wiring connection of the binary input must be changed. Instead of an external voltage supply, a floating contact is needed. Otherwise, the switching state cannot be recognized.

Testing according to DIN EN 14597

The Type 3374 Electric Actuator with fail-action "Actuator stem extends" is tested by the German Technical Inspectorate (TÜV) according to DIN EN 14597 in combination with various SAMSON valves. The register number is available on request.

2.1 Versions

The Type 3374 Electric Actuator is available with or without fail-safe action.

Version with fail-safe action

Type 3374-2x and Type 3374-3x Actuators are able to perform a fail-safe action and contain a spring assembly and an electromagnet. The actuator moves to the fail-safe position when the electromagnet is de-energized.

➔ **Do not use the fail-safe action to control the valve position!**

2.2 Limit contacts

The actuator can be equipped **with either mechanical or electronic limit contacts** to influence the tasks of control equipment.

2.2.1 Mechanical limit contacts

The two mechanical limit contacts can be adjusted independently from one another. They are operated by mechanical pins. The installation and adjustment of the mechanical limit contacts is described in section 7.

2.2.2 Electronic limit contacts

The two electronic limit contacts consist of relays with changeover contacts. In contrast to the mechanical limit contacts, the electronic limit contacts no longer function after a power supply failure. The relays are de-energized and the contacts change to the idle state. The retrofitting and adjustment of the electronic limit contacts is described in section 8.

2.3 Technical data

Table 1: *Version without fail-safe action*

Actuator **Type 3374**		**-10**	**-11**	**-15**	
Type of connection		With yoke [1]		With ring nut [2]	
Travel	mm	30	15	30	
Travel limit		Between 10 and 100 % of the rated travel			
Electrical connection					
Power supply		24 V AC ±15 %, 47 to 63 Hz 24 V DC ±15 % 85 to 264 V AC, 47 to 63 Hz			
Power consumption		**Speed level: Normal · Fast**			
24 V	AC	12 VA · 20 VA			
	DC	8 W · 13.5 W			
85 to 264 V	AC	15.5 VA · 24 VA			
Possible fuse protection		Melting integral of upstream fuse: $I^2t_s \geq 12\ A^2s$			
Transit time in s · Stroking speed in mm/s					
Normal [3]		120 · 0.25	60 · 0.25	120 · 0.25	240 · 0.125
Fast [4]		60 · 0.5	30 · 0.5	60 · 0.5	120 · 0.25
Thrust in kN					
Stem extends		2.5	2.5	2.5	5 [5]
Stem retracts		2.5	2.5	2.5	5 [5]
Manual override		4 mm hex wrench. Refer to section 6.			
Weight					
kg (approx.)		3.5	3.5	3.6	

1) For attachment to SAMSON Series V2001 Valves (DN 15 to 80) and to SAMSON Type 3260 (DN 65 to 150) and Type 3214 Valves (DN 65 to 100)
2) For attachment to SAMSON Series 240 Valves and to SAMSON Type 3214 Valve (DN 125 to 250)
3) Normal speed level (Code c64 = NORM)
4) Fast speed level (Code c64 = FAST)
5) In preparation

Table 2: *Version with fail-safe action*

Actuator Type 3374		**-21**	**-26**	**-31**	**-36**
Type of connection		With yoke [1]	With ring nut [2]	With yoke [1]	With ring nut [2]
Fail-safe action		Stem extends		Stem retracts	
Travel	mm	15		15	
Travel limit		Between 10 and 100 % of the rated travel			
Electrical connection					
Power supply		24 V AC ±15 %, 47 to 63 Hz 24 V DC ±15 % 85 to 264 V AC, 47 to 63 Hz			
Power consumption		**Speed level: Normal · Fast**			
24 V	AC	13.5 VA · 22 VA			
	DC	10 W · 15 W			
85 to 264 V	AC	18.5 VA · 27 VA			
Possible fuse protection		Melting integral of upstream fuse: $I^2t_s \geq 12\ A^2s$			
Transit time in s · Stroking speed in mm/s					
Normal [3]		60 · 0.25	60 · 0.25	60 · 0.25	60 · 0.25
Fast [4]		30 · 0.5	30 · 0.5	30 · 0.5	30 · 0.5
Upon fail-safe action		12 · 1.25	12 · 1.25	12 · 1.25	12 · 1.25
Forces in kN					
Thrust (stem extends)		2	2	2	2
Thrust (stem retracts)		0.5	0.5	0.5	0.5
Nominal thrust of safety spring		2	2	0.5	0.5
Manual override		–			
Weight					
kg (approx.)		4.2	4.3	3.8	3.9

1) For attachment to SAMSON Series V2001 Valves (DN 15 to 80) and to SAMSON Type 3260 (DN 65 to 150) and Type 3214 Valves (DN 65 to 100)
2) For attachment to SAMSON Series 240 Valves and to SAMSON Type 3214 Valve (DN 125 to 250)
3) Normal speed level (Code c64 = NORM)
4) Fast speed level (Code c64 = FAST)

Table 3: *Common data*

Type 3374-xx Actuator		
Input signal	Voltage input	0/2 to 10 V, adjustable · R_i = 20 kΩ
	Current input	0/4 to 20 mA, adjustable · R_i = 50 Ω
	Note: Only one of the two inputs may be connected.	
Position feedback	Voltage	0/2 to 10 V, adjustable · Error message 12 V
	Resolution	1000 steps or 0.01 V
	Load	Minimum 5 kΩ
	Current	0/4 to 20 mA, adjustable · Error message 24 mA
	Resolution	1000 steps or 0.02 mA
	Load	Max. 200 Ω
Binary input		Not galvanically isolated · Polarity configurable
Binary output	Normal polarity	Floating · Galvanically isolated · Max. 24 V DC/50 mA No short-circuit protection · Polarity configurable
Applications	Positioner	The travel follows the input signal
	PID controller	Simple fixed set point control
	Two-step mode	Two-step behavior, control over binary input
Display		Icons for functions and codes; with backlight
Rotary pushbutton		Operating control for on-site operation to select and confirm codes and values
Interfaces	Standard	RS-232 · For point-to-point connection to communication participants or for memory pen · Permanently installed Connection: RJ-12 connector socket at front
Motor deactivation		By torque-dependent limit switches
Ambient temperature/conditions		5 to 60 °C · 5 to 95 % relative humidity, no dew formation
Storage temperature		–25 to 70 °C
Perm. temperature at the connecting stem		5 to 130 °C
Degree of protection acc. to EN 60529		IP 54 with cable entries IP 65 with cable glands Suspended mounting position not approved according to EN 60664
Class of protection		II according to EN 61140

Degree of contamination		2 according to EN 61010
Overvoltage category		II according to EN 61010
Noise immunity		According to EN 61000-6-2
Noise emission		According to EN 61000-6-3
Mechanical environmental conditions		Class 1M2 according to EN 60721-3-1:1998
		Class 2M1 according to EN 60721-3-2:1998
		Class 3M4 according to EN 60721-3-3:1998
		Class 4M4 according to EN 60721-3-4:1998
Materials		Housing and cover: Plastic (glass-fiber reinforced PPO) Actuator stem: 1.4104
Additional electrical equipment		
Limit contacts	Mechanical	Two adjustable limit contacts with changeover contacts; 230 V AC, 1 A · Without contact protection
	Electronic	Two adjustable limit contacts with relay and changeover contacts; 250 V AC, 1 A · Without contact protection

3 Installation

3.1 Mounting position

The control valve can be installed in the pipeline in any desired position. However, a suspended mounting position of the actuator is not permissible (see Fig. 1).

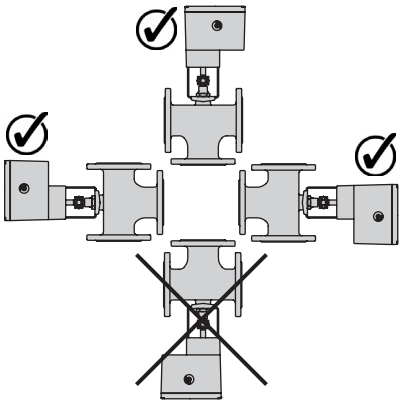


Fig. 1: *Mounting position*

3.2 Attachment to valve

3.2.1 Construction with integrated yoke

Fig. 2A:
Attachment to
– Series V2001 Valves (DN 15 to 80)
– Type 3260 (DN 65 to 150)
– Type 3214 (DN 65 to 100)

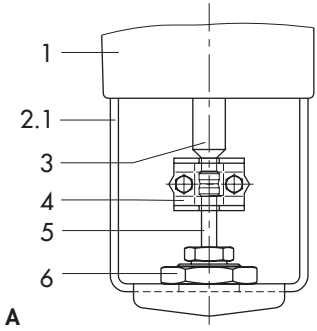
1. Remove protective covers and unscrew nut (6) from the valve.
2. Connect the power supply as described in section 4 on page 15.
3. Retract actuator stem (3) as described in section 6.
4. Place actuator on yoke and fasten tight using nut (6, 36 mm width across flats) (tightening torque min. 150 Nm).
5. When the plug stem (5) fits closely onto the actuator stem (3), attach both stem connector clamps (4) and fasten with screws.

3.2.2 Construction with ring nut

Fig. 3B:
Attachment to Series 240 Valves

1. Slide plug stem down to close the valve.
2. Turn the stem connector nut (8) until the measurement x = 75 mm (DN 100 and larger: x = 90 mm) from the top of the yoke to the head of the stem connector nut (8) is achieved. Lock this position with the lock nut (9).

Types 3374-10/-11/-21/-31
Connection with yoke
Attachment to Series V2001 Valves,
Type 3260 (DN 65 to 150),
Type 3214 (DN 65 to 100)



1 Actuator
2.1 Actuator yoke
2.2 Valve yoke
2.3 Bonnet
3 Actuator stem
4 Stem connector
5 Plug stem
6 Nut
7 Ring nut
8 Stem connector nut
9 Lock nut
10 Travel indicator scale

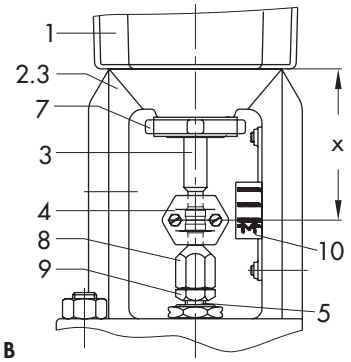
Fig. 2: *Attachment to the valve*

3. Connect the power supply as described in section 4.
4. Retract actuator stem (3) as described in section 6.
5. Place actuator onto the valve bonnet (2.3) and secure using the ring nut (7).
6. When the stem connector nut (8) rests on the actuator stem, attach both stem connector clamps (4) and fasten with screws.
7. Move actuator stem (3) to the end position (valve closed) as described in section 6.
8. Align travel indicator scale (10) with the middle of the stem connector (4) and screw tight.

Fig. 3C:
Attachment to Type 3214 Valve (DN 125 to 250)

1. Connect the power supply as described in section 4.
2. Retract actuator stem (3) as described in section 6.
3. Place actuator onto the valve and secure using the ring nut (7). If necessary, retract the actuator stem slightly beforehand.
4. When the plug stem fits closely onto the actuator stem (3), attach both stem connector clamps (4) and fasten with screws.
5. Move actuator stem (3) to the end position (valve closed) as described in section 6.
6. Align travel indicator scale (10) with the middle of the stem connector (4) and screw tight.

Types 3374-15/-26/-36
Connection with ring nut
Attachment to Series 240 Valves



Types 3374-15/-26/-36
Connection with ring nut
Attachment to Type 3214 Valve (DN 125 to 250)

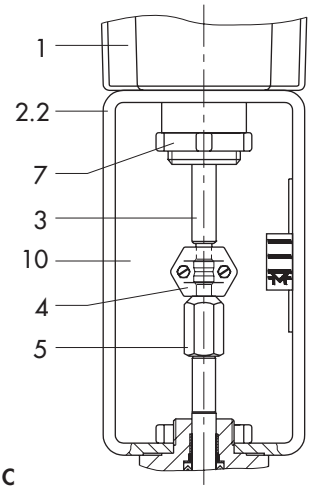


Fig. 3: *Attachment to the valve*

4 Electrical connections

DANGER!

– *Upon installation of the electric cables, you are required to observe the regulations concerning low-voltage installations according to DIN VDE 0100 as well as the regulations of your local power supplier.*

– *Only connect the actuator to the mains power network when the power is switched off.*

Establish electrical connections as illustrated in Fig. 4. Guide the cables to the plug-in terminals from the top. The following cables and stranded wires can be used:

Cable	Cross section
Single-wire H05(07) V-U [1)]	0.2 to 1.5 mm²
Fine-wire H05(07) V-K [1)]	0.2 to 1.5 mm²
With wire-end ferrule acc. to DIN 46228-1	0.25 to 1.5 mm²
With wire-end ferrule and sleeve acc. to DIN 46228-4	0.25 to 0.75 mm²

1) 8 mm stripped insulation at cable end

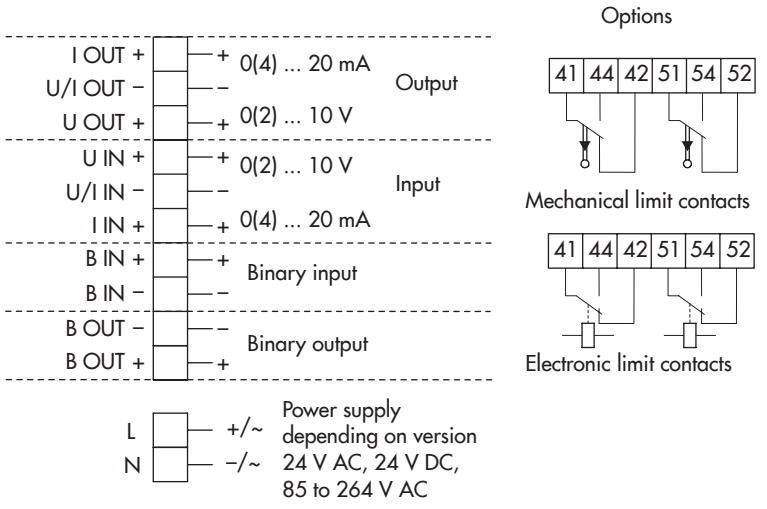


Fig. 4: *Electrical connection*

5 Putting the actuator into operation

1. Mount the actuator onto the valve. Refer to section 3.2.
2. On starting up the actuator for the first time, the start screen and the error reading E00 "RUNT" (no initialization performed) appear in alternating sequence. Refer to Fig. 11 on page 23.
3. Initialize the actuator. Refer to section 12.3 on page 31.
4. Configure actuator by changing parameter settings. Refer to section 13 on page 35.

6 Manual override

The manual override is used to move the actuator stem manually and is only available for actuators **without** fail-safe action.

➔ Do not operate the manual override while the actuator is running and only when the power supply is disconnected.

The hex wrench ***cannot*** be used for manual override in actuators ***with*** fail-safe action.

➔ The actuator stem in this case can only be moved by placing the actuator into MAN mode. Refer to section 6.2.

6.1 Mechanical override (only actuators without fail-safe action)

To operate the manual override, place a 4 mm hex wrench on the red actuator shaft located at the side of the housing. The hex wrench is included in the scope of supply. It is attached to the bottom of the housing.

6.2 Moving the actuator stem manually

First place the actuator into MAN mode to move the actuator stem manually. The operation and selection of the operating mode are described in section 12.1 on page 29.

7 Mechanical limit contacts

7.1 Installing the limit contacts

Note:
When ordering, state the configuration ID (Var.-ID) and the type designation of the actuator. Both specifications are written on the nameplate. Refer to section 17.2 on page 65.

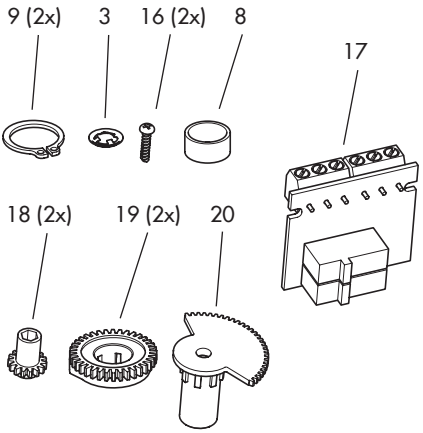
Required accessories:

To install the limit contacts, the retrofit kit (order no. **1402-0898**) is required.

Installing limit contacts (Fig. 6 to Fig. 8):

DANGER!
When installing electrical equipment, make sure the power supply is switched off and the signal input is disconnected first.

Tip:
We recommend applying a small amount of lubricant (e.g. Vaseline) to the spindles on the gear faces and to the sides of the cogs.



3 Serrated ring
8 Spacer
9 Retaining ring
16 Screw
17 Terminal board (similar to the illustration shown)
18 Adjustment gear
19 Contact cam
20 Cam holder

Note:
The contact cams (19) are ready-mounted to the cam holder (20) and the retaining rings (9) to form the contact cam unit (21, see Fig. 8).

Fig. 5: *Accessories order no. 1402-0898*

Note:
To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.

1. Undo screws on housing cover and take the cover off the actuator.

Move the actuator stem to the end position depending on the fail-safe action "Actuator stem extends" or "Actuator stem retracts". Refer to section 6.

2. Remove serrated ring and shim from spindle (11).
3. Slide adjustment gears (18) onto their spindles and fasten with one screw (16) each. Check whether the adjustment gears can be turned easily. If not, slightly loosen its screw again.
4. Turn contact cams (19) on the cam holder (20) as illustrated in Fig. 6 corresponding with the position of the actuator stem.
5. Slide the spacer (8) onto the spindle (11). Make sure that the long wire of the tension spring rests on the spacer and on the intermediate gear.
6. Slide the contact cam unit (21) onto the spindle corresponding with the position of the actuator stem as illustrated in Fig. 7. Make sure that the outermost cog of the contact cam unit engages in the gearwheel of the intermediate gear (1). In addition, the adjustment gears (18) must engage properly in the corresponding gears of the contact cam unit (21).
7. Secure the contact cam unit (21) and intermediate gear (1) with the serrated ring (3); push down the serrated ring as far as it will go.
8. Position the terminal board (17) at the base of the support at a 45° angle (approx.) with the switches pointing towards the gears. Swivel the upper end of the terminal board towards the gears until the board is in a vertical position and properly engaged in the support.
9. Adjust limit contacts as described in section 7.2.
10. Replace cover. Briefly turn the fastening screws counterclockwise with a screwdriver to center them. Then fasten down the cover by tightening the screws.

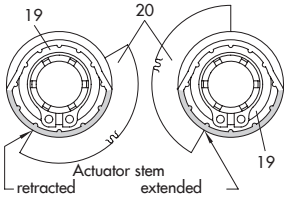


Fig. 6: *Alignment of contact cam and cam holder*

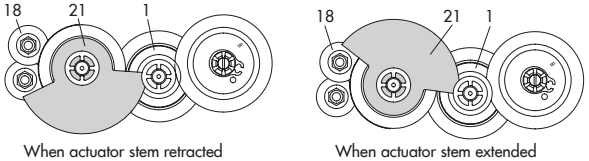
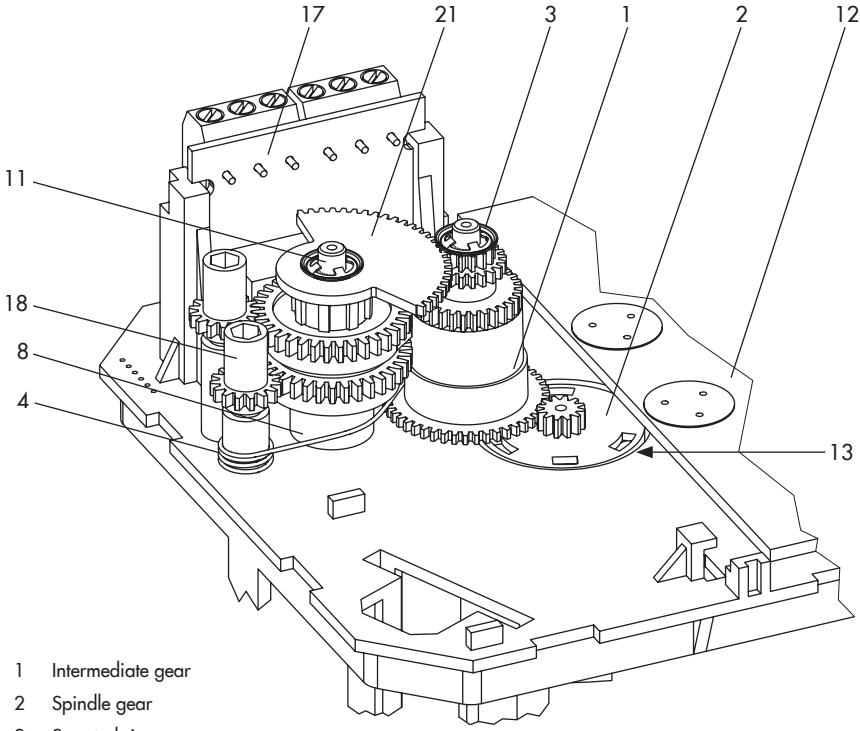


Fig. 7: *Alignment of the contact cam unit*



1 Intermediate gear
2 Spindle gear
3 Serrated ring
4 Tension spring
8 Spacer
11 Spindle
12 Actuator board
13 Sleeve
17 Terminal board
18 Adjustment gear
21 Contact cam unit

State on delivery:
Spindle (11) with
serrated ring and shim

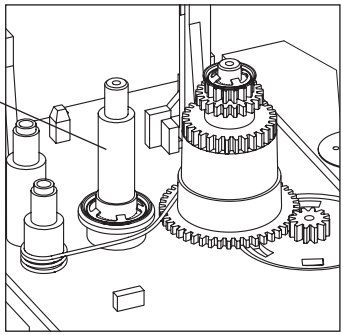


Fig. 8: *Installing the limit contacts*

7.2 Adjusting the limit contacts

Note:
To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.

1. Undo screws on housing cover and take the cover off the actuator.
2. Switch on power supply.
3. Move the valve, using manual override or the "manual level" operating mode, to the point at which the contact should react.
4. Use the 4 mm hex wrench to turn spindle of the adjustment gears (18) for the upper limit contact or for the lower limit contact until the associated contact cam on the contact cam unit (21) triggers the switch contact of the upper or lower microswitch on the terminal board (17).
5. Replace cover. Briefly turn the fastening screws counterclockwise with a screwdriver to center them. Then fasten down the cover by tightening the screws.

8 Electronic limit contacts

8.1 Installing the limit contacts

Required accessories

To install the electronic limit contacts, the retrofit kit (order no. **1402-0591**) is required.

Installing limit contacts:

DANGER!
Risk of electric shock!
Before installing electrical accessories, switch off the power supply and disconnect the signal input!

Note:
To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.

1. Undo screws on housing cover and take the cover off the actuator.
2. Move the actuator stem to the end position depending on the fail-safe action "Actuator stem extends" or "Actuator stem retracts". Refer to section 6.
3. Connect connecting cable to the plug-in location intended for it on the board.
4. Position the terminal board (17, see Fig. 8) at the base of the support at a 45° angle (approx.) with the relay pointing towards the edge of the intermediate board. Swivel the upper end of the terminal board until the board is properly engaged.

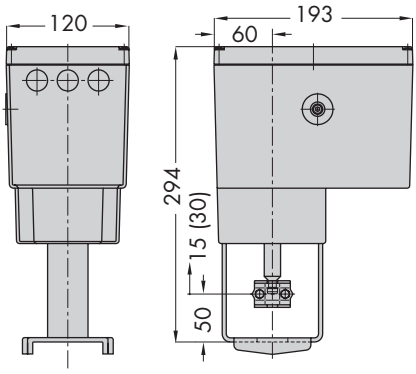
5. Adjust limit contacts as described in section 13.8.
6. Replace cover. Briefly turn the fastening screws counterclockwise with a screwdriver to center them. Then fasten down the cover by tightening the screws.

8.2 Adjusting the limit contacts

The electronic limit contacts are adjusted at the operating controls of the actuator (refer to section 10). Refer to section 13.8 on how to adjust them.

9 Dimensions in mm

Types 3374-10/-11/-21/-31
Connection with yoke



Types 3374-15/-26/-36
Connection with ring nut

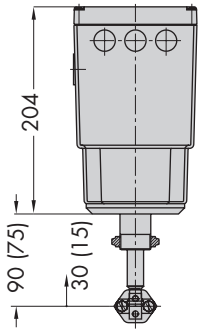


Fig. 9: *Dimensions in mm*

10 Operating controls

Note:
The operating controls are located underneath the housing cover. To undo the screws on the housing cover, use a Pozidriv PZ2 screwdriver to get enough hold on the screw heads.

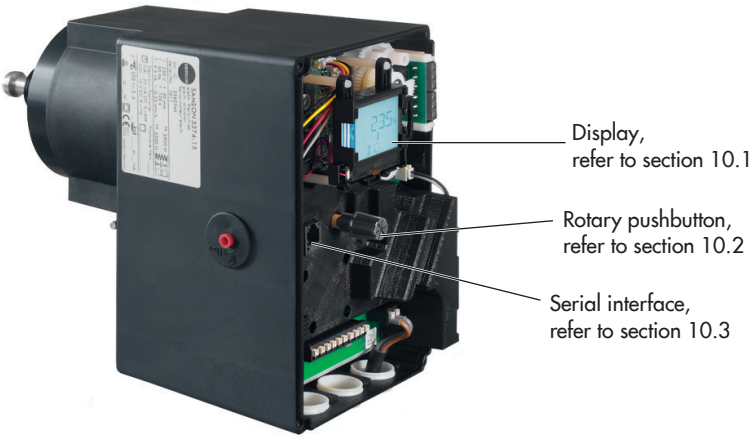
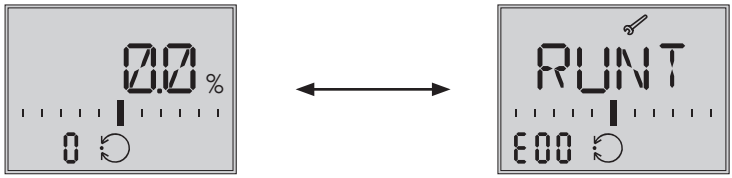


Fig. 10: *Operating controls (with housing cover removed)*

10.1 Display

After switching on the power supply, the current firmware appears on the display for two seconds. Afterwards, the start screen appears.



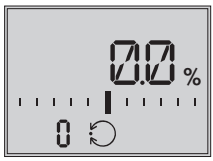
On starting up the actuator for the first time, the start screen and the error reading E00 (no initialization performed) appear in alternating sequence.

After start-up, the actuator is ready for use. Refer to section 5 on page 16.

Fig. 11: *Start screen after switching on the actuator for start-up*

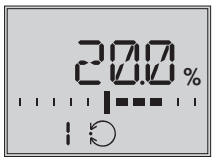
Start screen

The start screen (Fig. 12) depends on the selected application (refer to section 12.5 on page 33). On starting up the actuator for the first time and after loading the default settings, the positioner application (ACTU) is automatically selected.



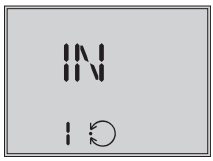
Start screen with positioner application (ACTU)

Displayed reading: travel



Start screen with PID controller application (PID)

Displayed reading: actual valve position



Start screen with two-step mode application (OPEN)

Displayed reading: state

Fig. 12: *Start screen depending on application*

Readings

– **Operating modes:** automatic mode, manual mode

– **Bar graph:** The bars indicate the system deviation that depends on the sign (+/–) and the value.
One bar element appears per 1 % system deviation.

Example:

Bar graph indicates a +3 % system deviation. A maximum of five bar elements can appear on each side. Five bar elements indicate a system deviation ≥ 5 %.

– **Status messages:** failure, service
These icons indicate that an error has occurred.

– **Binary input/output active** (code in bottom left-hand corner of the display)**:**
Example: Code 0 on the display, binary input active
Example: Code 0 on the display, binary output active
Example: Code 0 on the display, binary input/output active

– **Configuration enabled:** indicates that the parameters in the configuration and diagnostic levels have been enabled for configuration.

– **Limit contacts: reading 1, reading 2**: Indicates that the actuator stem position has fallen below or exceeded the switching point of the electronic limit contact. Refer to section 13.8.

– **Default setting:** When the scale of the bar graph is not visible and only one bar element either side of the center is visible, this means the indicated parameter is the same as the default setting.

– **mA unit:** The icon indicates the mA unit in conjunction with a reading.

Note:
The display can be adapted to the mounting situation of the actuator:
– Adapt the reading direction. Refer to section 12.2.1.
– Switch backlight permanently on. Refer to section 12.2.2.

10.2 Rotary pushbutton

The rotary pushbutton is used for on-site operation of the actuator.

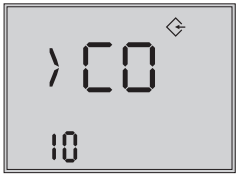
Turn ⊛: Select/change codes and values

Press ⊛: Confirm setting/change

NOTICE

Changed parameters are immediately effective!
The process is directly affected by these changes.
First check any changes made to parameters before confirming them by pressing the rotary pushbutton.

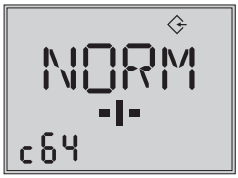
10.2.1 Menu control



Activate level/parameter
(› indicates a jump to another level with further options)

⊛ Turn → Required code

⊛ Press → Confirm. Code is selected.
Example shown: Configuration level ***Code 10*** selected

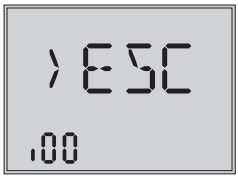


Setting parameters

⊛ Press (blinking display)

⊛ Turn → Required setting

⊛ Press → Setting is saved
Example shown: Speed level ***Code c64*** set to NORM.

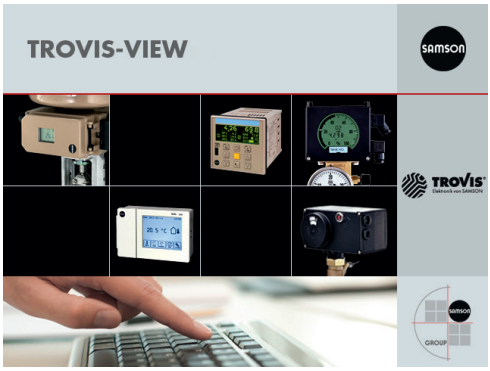


Exit level

⊛ Press → Exit level.
Example shown: Information level exited.

10.3 Serial interface

The actuator can be configured with the TROVIS-VIEW software. In this case, the serial interface on the actuator is used to connect the actuator to the computer.



Note:
TROVIS-VIEW provides a uniform user interface that allows users to configure and parameterize various SAMSON devices using device-specific database modules. The Type 3374 device module can be downloaded free of charge from our website (www. samson.de) at Services > Software > TROVIS-VIEW. Further information on TROVIS-VIEW (e.g. system requirements) is available on our website and in the Data Sheet ▶ T 6661 EN as well as the Operating Instructions ▶ EB 6661 EN.

Required accessories for connecting the actuator to a computer

– Connecting cable RJ-12/D-sub 9-pin (order no. 1400-7699)
– USB to RS-232 adapter (order no. 8812-2001)

Fig. 13: *Connecting cable RJ-12/D-Sub, 9 pin*

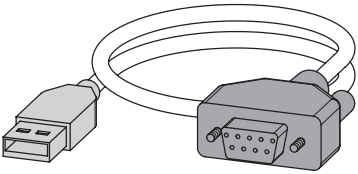


Fig. 14: *USB/RS-232 adapter*

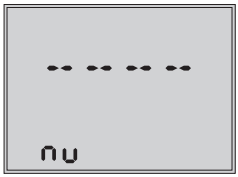
11 Key number

Some parameters require the service key number to be entered before the parameter setting can be changed. If a code is selected without entering a key number beforehand, LOCK appears on the display and the parameter settings cannot be changed.

To enter the key number, proceed as follows:

Note:
The service key number can be found on page 75. To avoid unauthorized use of the service key number, remove the page or make the key number unreadable.

Turn → ***Code 9***
(operating level to enter the key number)
Press



Display: Input field for key number
Press → Input field is enabled

Turn → Set service/customized key number
Press → Confirm key number

Display: ⇦ indicates that the configuration level is enabled to allow the user to change parameter settings.

After entering the key number, the corresponding levels are enabled for five minutes (indicated by icon).

Levels can also be locked again: Select Code 9 again. OFF appears on the display. After confirming it by pressing, the icon disappears.

11.1 Customized key number

A customized key number can be used in addition to the fixed service key number. Enter this key number in Code 9 as described for the service key number. The default key number is "0000". The customized key number can be changed in Code c92. If the customized key number is deactivated in Code c91, only the service key number is active.

Code	Description	WE	Adjustment range
c91	Customized key number active	YES	NO (deactivated), YES (activated)
c92	Customized key number	0000	0000 to 1999

12 Operating level

The operating level is active while the actuator is in the automatic mode. In this level, important information on the operation is shown, the operating mode is selected and the initialization started. The other levels are accessible from the operating level.

All the parameters of the operating level are listed in section 17.1.1 on page 56.

12.1 Selecting operating mode

The actuator is normally in automatic mode indicated by the ↻ icon (displayed in Code 0 to 3). In automatic mode, the actuator stem follows the input signal according to the functions set in the configuration level.

In manual mode, the actuator stem moves to the adjusted manual position value. An active manual mode is indicated in Code 0 by the ✓ icon.

Code	Description	WE	Adjustment range
2	Select the operating mode	–	AUTO (automatic mode), MAN (manual mode)
3	Manual position value	–	0.0 to 100.0 %

Note:
The manual position values selected in Code 3 must be adjusted by the amount corresponding to at least half the dead band (adjustable in c67, see page 44). Otherwise, the actuator stem will not move.
Example: *Dead band adjusted to 2.0 % (default setting)*
→ The manual position value must be adjusted by at least 1.0 % (for example, moving the actuator stem from 2.2 % to 3.2 %).

12.2 Adapting the display

12.2.1 Reading direction

To adapt the reading on the display to the mounting situation of the actuator, the display contents can be turned by 180° in Code 4.

Code	Description	WE	Adjustment range
4	Change reading direction of display	DISP	DISP, dSIC

12.2.2 Backlight

The display backlight can be changed to be always switched on in Code c93.

Code	Description	WE	Adjustment range
c93	Backlight always on	NO	NO, YES

Note:

– *Regardless of the setting in Code c93, the backlight starts to blink whenever an error occurs. Refer to section 12.4.*

– *The display backlight can also be switched on and off by the binary input. Refer to section 13.6.*

12.3 Initializing the actuator

WARNING!
Risk of injury due to the actuator stem extending or retracting!
Do not touch or block the actuator stem!

NOTICE
The process is disturbed by the movement of the actuator stem!
Do not perform the initialization while the process is running! First isolate the plant by closing the shut-off valves!

During initialization, the actuator stem moves from its current position to the 100 % end position. Starting from the 100 % end position, the actuator stem moves to the 0 % end position.

Note:
The 0 % and 100 % end positions depend on the operating direction used. Refer to section 13.3.

Code	Description	WE	Adjustment range
5	Start initialization		INI

or:

Code	Description	WE	Adjustment range
d52	Start initialization		INI

12.4 Reading errors

If an error has occurred, the start screen starts to blink and the icon appears. In the operating level, the active errors appear on the display after Code 20.

Note:

– *If several errors have occurred, only the error with the highest priority is shown on the start screen.*

– *The errors of the operating level are also displayed in the diagnostic level in Codes d10 to d45.*

– *Refer to section 15.2 which also contains instructions on troubleshooting.*

Error messages in order of their priority:

Priority	Error		Description
1	E11 [1)]	NTRV	No basic setting
2	E12 [1)]	NCO	No configuration
3	E06	MOT	Motor or potentiometer not turning
4	E03	SWI	Both limit switches are active
5	E04	SIN	Canceled while retracting stem
6	E05	SOUT	Canceled while extending stem
7	E02	BLOC	Blockage (only when c51 = YES. Refer to section 13.10)
8	E01	FAIL	Input signal failure (only when c31 = YES. Refer to section 13.2)
9	E00	RUNT	No initialization performed
10	E13 [1)]	NCAL	No calibration
11	E14 [1)]	NPOT	No potentiometer calibration
12	E15 [1)]	NRUN	No transit time

[5)] EEPROM error. Refer to section 15.2.

12.5 Applications

The actuator's application can be selected from one of the following applications:

– Positioner
– PID controller
– Two-step mode

12.5.1 Positioner

(06 = ACTU)

The actuator stem's position directly follows the input signal.

12.5.2 PID controller

(06 = PID)

The set point adjustable at the actuator is used to position the valve using a PID algorithm. The input signal is used as the actual valve position. The PID controller is adjusted using the parameters: Proportional-action coefficient Kp, Reset time Tn and Derivative-action time Tv:

The *proportional-action coefficient Kp* acts as gain.

The *reset time Tn* is the time it takes for the integral component during a step response in a PI controller to produce a change in the manipulated variable identical to the change produced by the P component. Increasing the reset time Tn reduces the rate of change in the output when the set point deviation is constant.

The *derivative-action time Tv* is the time it takes the rise response of a PD controller to reach a certain manipulated variable value earlier than it would take the response with the P component only. Increasing the derivative-action time Tv causes an increase in the manipulated variable amplitude when the rate of change is constant. After ramped changes of the set point deviation, a longer derivative-action time Tv causes the D component to have a longer effect.

12.5.3 Two-step mode

(06 = OPEN)

The binary input is used for this function. When the binary input is in the active switching state, the actuator stem retracts to 100 % of the adjusted travel range. When the binary input is in the inactive switching state, the actuator stem extends to move the valve to the closed position (0 %).

Note:
To change the application, a service or customized key number must be entered first. Refer to section 11 on page 27.

Code	Description	WE	Adjustment range
6	Application	ACTU	ACTU (positioner), PID (PID controller), OPEN (two-step mode)

13 Configuration level

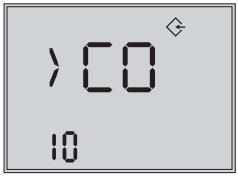
The actuator is adapted to its control task in the configuration level. The codes in this level have a '**c**' prefix to identify them.

Note:
To change parameters in the configuration level, a service or customized key number must be entered first. Refer to section 11 on page 27.

All the parameters of the configuration level are listed in section 17.1.2 on 57.

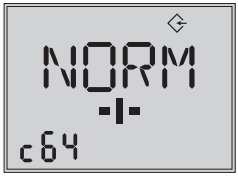
13.1 Activating and setting parameters

Changing settings in the configuration level



Activate the configuration level

- Turn → ***Code 10***
- Press → Activate the configuration level



Change parameter setting (in this example: Speed level)

- Press (blinking display)
- Turn → Required setting
- Press (to confirm setting)

Exit configuration level

- Turn → ***c00***
- Press

13.2 Input signal

The input signal determines the actuator stem position. Either a current or voltage signal can be applied to the input. The default lower and upper range values of the input signal are 2 to 10 V or 4 to 20 mA. The input signal range can be adapted, e.g. to achieve a plant operation characteristic by connecting two or more actuators in parallel (split-range operation).

Example: Two valves regulate the process medium in one common pipeline to achieve a large rangeability. One valve opens with a 0 to 5 V input signal, while the second valve also opens when the input signal increases further (5 to 10 V) and the first valve remains open. The two valves close in the reverse order.

Note:
At least 2.5 V or 5 mA (depending on the input signal used) must separate the upper and lower range values.

Code	Description	WE	Adjustment range
c01	Unit	mA	mA (current signal), V (voltage signal)
c02	Lower range value	2.0 V or 4.0 mA	0.0 to 7.5 V or 0.0 to 15.0 mA
c03	Upper range value	10.0 V or 20.0 mA	2.5 to 10.0 V or 5.0 to 20.0 mA

Detect input signal failure

The actuator detects a failure of the input signal and the error reading E01 starts to blink on the display as soon as the input signal falls below the lower range value by 0.3 V or 0.6 mA. If the input signal failure function is active (c31 = YES), the reaction of the actuator upon failure of the input signal is determined by Code c32:

– **Internal travel value (c32 = INT):** The actuator stem moves to the position specified in Code c33 upon failure of the input signal.
– **Last travel value (c32 = LAST):** The actuator stem remains in the last position that the valve moved to before failure of the input signal.

The error message is reset and the actuator returns to closed-loop operation if the input signal moves within 0.2 V or 0.4 mA of the lower range value.

Code	Description	WE	Adjustment range
c31	Detect input signal failure	NO	NO (function not activated), YES (function activated)
c32	Reference value upon input signal failure	INT	INT (internal travel value), LAST (last travel value)
c33	Internal travel value	0.0 %	0.0 to 100.0 %

13.3 Operating direction

– **Increasing/increasing (c42 = >>):**
  The actuator stem retracts as the input signal increases.
– **Increasing/decreasing (c42 = <>):**
  The actuator stem extends as the input signal increases.

Actuator stem extended
– With globe valves: Valve closed
– With three-way mixing valves: Port A -> AB open, B -> AB closed
– With three-way diverting valves: Port AB -> A closed, AB -> B open

Actuator stem retracted
– With globe valves: Valve open
– With three-way mixing valves: Port A -> AB closed, B -> AB open
– With three-way diverting valves: Port AB -> A open, AB -> B closed

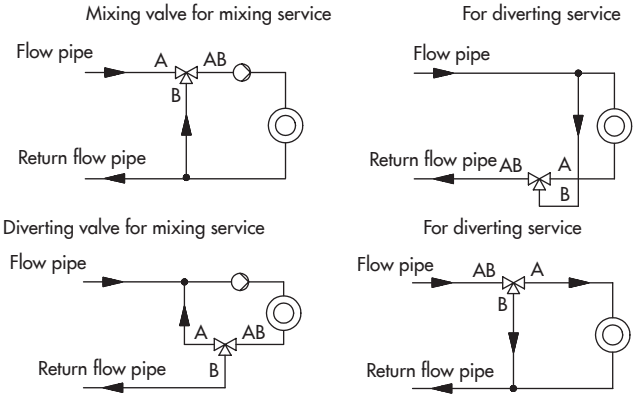


Fig. 15: *Operating principle of three-way mixing and diverting valves*

Code	Description	WE	Adjustment range
c42	Operating direction	>>	>> (increasing/increasing), <> (increasing/decreasing)

13.4 End position guiding

The actuator stem moves to the end positions early if the end position guiding function is active:

13.4.1 Operating direction increasing/increasing

– **End position guiding: valve open (c35):** The actuator stem moves the valve to the ***top end position*** if the input signal reaches the value entered in this code. Setting c35 = 100.0 % causes this function (end position guiding: valve open) with a retracting actuator stem to be deactivated.

– **End position guiding: valve closed (c36):** The actuator stem moves the valve to the ***lower end position*** if the input signal reaches the value entered in this code. Setting c36 = 0.0 % causes this function (end position guiding: valve closed) with an extending actuator stem to be deactivated.

13.4.2 Operating direction increasing/decreasing

– **End position guiding: valve open (c35):** The actuator stem moves the valve to the ***lower end position*** if the input signal reaches the value entered in this code. Setting c35 = 100.0 % causes this function (end position guiding: valve open) with a retracting actuator stem to be deactivated.

– **End position guiding: valve closed (c36):** The actuator stem moves the valve to the ***top end position*** if the input signal reaches the value entered in this code. Setting c36 = 0.0 % causes this function (end position guiding: valve closed) with an extending actuator stem to be deactivated.

Code	Description	WE	Adjustment range
c35	End position guiding: valve open	97.0 %	50.0 to 100.0 %
c36	End position guiding: valve closed	1.0 %	0.0 to 49.9 %

13.5 Position feedback signal

The position feedback indicates the actuator stem position. The span of the position feedback signal is adjusted over the *lower* and *upper range value* parameters.

Note:
– *At least 2.5 V or 5 mA (depending on the input signal used) must separate the upper and lower range values.*
– *When c37 = YES, the position feedback signal is 12 V or 24 mA in the event of an error.*

Code	Description	WE	Adjustment range
c05	Unit	mA	mA (current signal), V (voltage signal)
c06	Lower range value	2.0 V or 4.0 mA	0.0 to 7.5 V or 0.0 to 15.0 mA
c07	Upper range value	10.0 V or 20.0 mA	2.5 to 10.0 V or 5.0 to 20.0 mA
c37	Position feedback indicates error	NO	YES (error reading active), NO (error reading inactive)

13.6 Binary input

The function and switching state of the binary input can be configured as required.

– **Inactive (c11 = NONE):** No function is assigned to the binary input.

– **Priority position (c11 = PRIO):** The priority position is triggered and the actuator stem moves to the position entered in Code c34 as soon as the binary input changes to the active switching state. The valve leaves the priority position and follows the input signal after the binary input changes to the inactive switching state.

– **Two-step mode (c11 = OPEN):** When the binary input is in the active switching state, the actuator stem moves to 100 % of the adjusted travel range. When the binary input is in the inactive switching state, the actuator stem extends to move the valve to the closed position. **This setting is only possible when 'Two-step mode' (06 = OPEN) is set as the application.**

– **Next entry in information level (c11 = NEXT):** If the NEXT function is selected in Code c11, the first code of the information level (i01) appears on the display as soon as binary input switching state is changed. After every new change to the active state, the next code of the information level appears (i02, i03 etc.). The display switches back to the start screen (Code 0 or Code 1 when PID controller is selected) after all the codes of the information level have been displayed due to the binary input switching or when the binary input's switching state remains unchanged for five minutes.

– **Backlight (c11 = LAMP):** When the binary input's switching state is active, the display backlight is switched on permanently.

– **Exit manual level for travel adjustment (c11 = MEND):** When the binary input's switching state is active, the actuator exits the manual mode. The actuator stem moves to the valve position determined by the automatic mode.

Code	Description	WE	Adjustment range
c11	Function	NONE	NONE (inactive), PRIO (priority position), OPEN (two-step mode), NEXT (next entry in information level), LAMP (backlight activated), MEND (exit manual level for travel adjustment)
c12	Switching state for active function	ON	OFF (binary input switched off), ON (binary input switched on)
When c11 = PRIO:			
c34	Travel for priority position	0.0 %	0.0 to 100.0 %

13.7 Binary output

The binary output is a floating contact. The function and switching state of the binary output can be configured as required.

- **Inactive (c15 = NONE):** No function is assigned to the binary output.
- **Error indication (c15 = FAIL):** When an error is registered (), the error message is issued at the binary output.
- **Limit contact (c15 = LIM):** The binary output is used as an electronic limit contact. Refer to section 13.8. To configure this function, the required settings must be made in Codes c21 to c23. The use of the binary output as an electronic limit contact is independent from the optionally installed electronic limit contacts.
- **Priority position (c15 = PRIO):** When the priority position function is active (c11 = PRIO), this is registered at the binary output after the actuator stem stops moving.
- **Adopt binary input's state (c15 = BIN):** The binary output reproduces the logical state of the binary input.
- **Display manual mode (c15 = MAN):** The binary output is active when the manual mode (MAN) is active (Code 2).

Code	Description	WE	Adjustment range
c15	Function	NONE	NONE (inactive), FAIL (error indication), LIM (limit contact), PRIO (priority position), BIN (adopt binary input's state), MAN (show manual mode)
c16	Switching state for active function	ON	OFF (binary output deactivated), ON (binary output activated)
When c15 = BIN			
c21	Electronic limit contact (binary output) Message in case of event	NONE	NONE (inactive), HIGH (upper limit violation), LOW (lower limit violation)
c22	Switching value of electronic limit contact (binary output)	10.0 %	0.0 to 100.0 %
c23	Hysteresis of electronic limit contact (binary output)	1.0 %	0.0 to 10.0 %

13.8 Electronic limit contacts

The electronic limit contact can be triggered by the actuator stem position exceeding or falling below an adjustable switching value.

– **Triggered when the position exceeds the switching value:** The limit contact is activated when the actuator stem position moves beyond the *switching value*. The limit contact is deactivated when the actuator stem position moves below the switching value (plus *hysteresis*).
– **Triggered when the position moves below the switching value:** The limit contact is activated when the actuator stem position moves below the *switching value*. The limit contact is deactivated when the actuator stem position moves beyond the switching value (plus *hysteresis*).

Note:
An activated limit contact remains permanently active if the switching value is smaller than the hysteresis. This limit contact can only be deactivated by a restart (refer to section 15.5) or by resetting to NONE (c24, c27).

Code	Description	WE	Adjustment range
c24	Limit contact 1 Message in case of event	NONE	NONE (inactive), HIGH (upper limit violation), LOW (lower limit violation)
c25	Switching value of limit contact 1	10.0 %	0.0 to 100.0 %
c26	Hysteresis of limit contact 1	1.0 %	0.0 to 10.0 %
c27	Limit contact 2 Message in case of event	NONE	NONE (inactive), HIGH (upper limit violation), LOW (lower limit violation)
c28	Switching value of limit contact 2	90.0 %	0.0 to 100.0 %
c29	Hysteresis of limit contact 2	1.0 %	0.0 to 10.0 %

13.9 Restart

After a power supply failure lasting longer than three seconds, the actuator starts according to the restart conditions.

– **Normal (c43 = NORM):** The actuator remains in automatic mode and immediately follows the positioning value.
– **Zero calibration (c43 = ZERO):** The actuator performs a zero calibration.

– **Fixed positioning value (c43 = FIX):** The actuator switches to the manual mode and moves the actuator stem to the *Fixed positioning value on restart*.
– **Stop in manual level (c43 = STOP):** The actuator switches to the manual mode and sets the last positioning value to be the same as the manual position value.

Code	Description	WE	Adjustment range
c43	Restart	NORM	NORM (normal), ZERO (zero calibration), FIX (fixed positioning value), STOP (stop in manual level)
When c43 = FIX			
c44	Fixed positioning value on restart	0.0 %	0.0 to 100.0 %

13.10 Blockage

Detect blockage (c51)

The actuator detects a valve blockage by comparing the travel after the torque-dependent switch has been triggered with the travel measured on initialization. If the comparison shows that the limit switch was triggered too early, this indicates that there is a valve blockage. A blockage is indicated on the display by ▮▮.

Remove blockage (c52)

When the remove blockage function is active, the actuator stem extends and retracts 1 mm at the adjusted stroking speed three times in sequence.

Blocking protection (c53)

The blocking protection prevents the valve from seizing up. If the actuator stem is in the closed position (0 %), it is extended slightly and then moved back to the closed position 24 hours after it last moved.

Code	Description	WE	Adjustment range
c51	Blockage detection	NO	NO (function not activated), YES (function activated)
c52	Blockage removal	NO	NO (function not activated), YES (function activated)
c53	Blocking protection	NO	NO (function not activated), YES (function activated)

13.11 Travel

Limited travel range (c63)

The *Limited travel range* parameter determines in % how far the actuator stem can move at the maximum. The rated travel (c61) acts as the reference. When c63 = 100.0 %, the travel range is not limited.

Code	Description	WE	Adjustment range
c61	Rated travel	[mm]	– Read only –
c63	Limited travel range	100.0 %	10.0 to 100.0 %

Speed level (c64)

The actuator stem moves to the position determined by the input signal at the selected stroking speed. There are two different speed levels (NORM and FAST).

The transit time (c66) is calculated from the travel and the stroking speed (c65). The transit time is the time that the actuator stem needs to move through the adjusted travel. The following applies:

$$\text{Transit time [s]} = \frac{\text{Travel [mm]}}{\text{Stroking speed [mm/s]}}$$

Code	Description	WE	Adjustment range
c64	Speed level	NORM	NORM (normal), FAST (fast)
c62	Gear version		– Read only –
c65	Stroking speed	[mm/s]	– Read only –
c66	Transit time	[s]	– Read only –

Dead band (switching range)

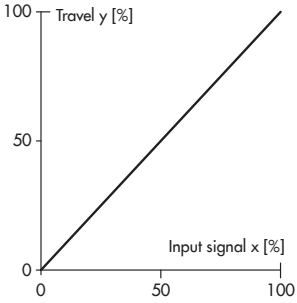
The dead band suppresses slight movements of the stem. The dead band represents the sum of the positive and negative hysteresis and the system deviation (steady-state error). After the actuator has been stationary, the input signal must change by at least half of the dead band to cause the actuator to move again.

Code	Description	WE	Adjustment range
c67	Dead band (switching range)	2.0 %	0.5 to 5.0 %

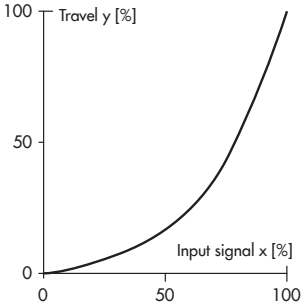
13.12 Characteristic

The characteristic expresses the relation between the input signal and the actuator stem's position.

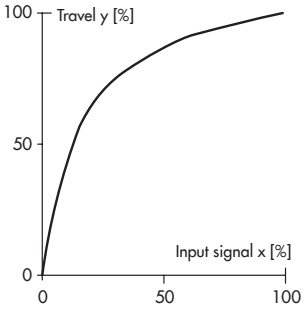
– **Linear (c71 = LIN):** The travel is proportional to the input signal.



– **Equal percentage (c71 = EQUA):** The travel is exponential to the input signal.



– **Reverse equal percentage (c71 = INV):** The travel is reverse exponential to the input signal.



– **User-defined (c71 = USER):** A new characteristic based on the last characteristic used can be defined over eleven points.

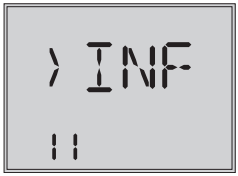
Code	Description	WE	Adjustment range
c71	Characteristic type	LIN	LIN (linear), EQUA (equal percentage), INV (reverse equal percentage), USER (user-defined)
When c71 = USER:			
c72 = USE	User-defined characteristic		
H0, Y0	Input signal X0, travel value Y0	0.0 %	0.0 to 100.0 %
H1, Y1	Input signal X1, travel value Y1	10.0 %	0.0 to 100.0 %
H2, Y2	Input signal X2, travel value Y2	20.0 %	0.0 to 100.0 %
H3, Y3	Input signal X3, travel value Y3	30.0 %	0.0 to 100.0 %
H4, Y4	Input signal X4, travel value Y4	40.0 %	0.0 to 100.0 %
H5, Y5	Input signal X5, travel value Y5	50.0 %	0.0 to 100.0 %
H6, Y6	Input signal X6, travel value Y6	60.0 %	0.0 to 100.0 %
H7, Y7	Input signal X7, travel value Y7	70.0 %	0.0 to 100.0 %
H8, Y8	Input signal X8, travel value Y8	80.0 %	0.0 to 100.0 %
H9, Y9	Input signal X9, travel value Y9	90.0 %	0.0 to 100.0 %
H10, Y10	Input signal X10, travel value Y10	100.0 %	0.0 to 100.0 %

14 Information level

In the information level, all the actuator data important for closed-loop operation are displayed. Codes of the information level have an '**i**' prefix to identify them.

All the parameters of the information level are listed in section 17.1.3 on page 62.

14.1 Activating parameters

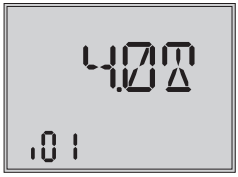


Activate the information level

Display: Code 0

Turn → Code 11

Press (display: ***i01***)



Activating parameters

Turn → Required code

Exit information level

Turn → ***i00***

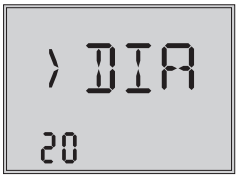
Press

15 Diagnostic level

The diagnostic level contains detailed information on the actuator and its operating state. Additionally, various test functions can be performed in this level. Codes in the diagnostic level have a '**d**' prefix to identify them.

All the parameters of the diagnostic level are listed in section 17.1.4 on page 63.

15.1 Activating and setting parameters

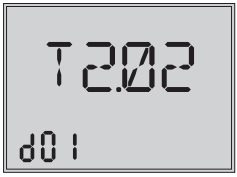


Activate the diagnostic level

Display: Code 0

⊛ Turn → Code 20

⊛ Press (display: ***d01***)



Activating parameters

⊛ Turn → Required code

Setting parameters

⊛ Press (blinking display)

⊛ Turn → Required setting

⊛ Press (to confirm setting)

Exit diagnostic level

⊛ Turn → ***d00***

⊛ Press

15.2 Troubleshooting

Note:
– *If a fatal or EEPROM error (marked by an asterisk) is generated, the icon is displayed in the start screen and the display backlight blinks.*
– *EEPROM errors are marked by 'E RD' on the display when they are read errors and 'E WR' when they are write errors.*

Diagnostic level	Code	Error	Corrective action to be taken
d10		Error during operation	
d20*	E00 [1)]	No initialization performed	Initializing the actuator
d21*	E01	Input signal failure (only when c31 = YES)	Check signal source and wiring
d22*	E02	Blockage (only when c51 = YES)	Check attachment and valve, if necessary. Check actuator stem.
d23*	E03	Both limit switches active	Send actuator to SAMSON
d24*	E04	Canceled while retracting stem	Send actuator to SAMSON
d25*	E05	Canceled while extending stem	Send actuator to SAMSON
d26*	E06	Motor or potentiometer not turning	Send actuator to SAMSON
d31*	E11	EEPROM error: Basic setting	Send actuator to SAMSON
d32*	E12	EEPROM error: Configuration	Check configuration
d35*	E13	EEPROM error: Calibration	Send actuator to SAMSON
d36*	E14	EEPROM error: Potentiometer calibration	Send actuator to SAMSON
d41		EEPROM error: Serial number	Send actuator to SAMSON
d42		EEPROM error: Manufacturing parameters	Send actuator to SAMSON
d43*	E15	EEPROM error: Transit time	Perform an initialization or transit time measurement
d44		EEPROM error: Status messages	Send actuator to SAMSON
d45		EEPROM error: Statistics	Send actuator to SAMSON

6) Error is only displayed in firmware version 2.04 and higher.

15.3 Start zero calibration

WARNING!
Risk of injury due to the actuator stem extending or retracting!
Do not touch or block the actuator stem!

The actuator stem moves to the 0 % end position. Following this, the actuator changes to closed-loop operation and moves the actuator stem to the position defined by the input signal.

Code	Description	Adjustment range
d51	Start zero calibration	ZER

15.4 Start initialization

The procedure is described in section 12.3 on page 31.

15.5 Restarting the actuator (reset)

The actuator can be restarted by performing a reset. Upon restart, the actuator goes into the automatic mode unless a different restart condition has been defined. Refer to section 13.9 on page 42.

Code	Description	Adjustment range
d53	Perform reset	RES

15.6 Loading default settings

All the parameters of the configuration level can be reset to their default settings (WE).

Note:
To load the default settings by selecting Code d54, the key number needs to be entered beforehand (refer to section 11 on page 27).

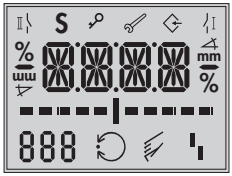
Code	Description	Adjustment range
d54	Loading default settings	DEF

15.7 Testing the display

All the segments of the display are shown during the display test when a display functions properly. The display test is performed by selecting Code d55 in the diagnostic level (Code 20).

Activate display test (Diagnostic level/Code 20)

- Turn → Code d55 (display: TEST)
- Press → Test is performed. All segments are shown on the display.



All segments shown

- Press → All segments are hidden (backlight remains switched on)
- Press again → Return to display d55 TEST

Code	Description	Adjustment range
d55	Testing the display	TEST (all segments displayed)

15.8 Measuring the transit time

WARNING!
Risk of injury due to the actuator stem extending or retracting!
Do not touch or block the actuator stem!

NOTICE
The process is disturbed by the movement of the actuator stem!
Do not perform the initialization while the process is running! First isolate the plant by closing the shut-off valves!

During transit time measurement, the actuator stem moves from its current position to the 0 % end position. Starting from the 0 % end position, the actuator stem moves to the 100 % end position and back again to the 0 % end position. The transit time is measured during the up and down strokes and the average transit time calculated.
After the measurement is completed, the actuator returns to closed-loop operation.

Note:
– *The 0 % and 100 % end positions depend on the operating direction used. Refer to section 13.3.*
– *The measured transit time depends on the speed level selected. Refer to section 13.11.*

Code	Description	Adjustment range
d61	Start transit time measurement	RUN
d62	Measured transit time [s]	– Read only –
d63	Measured travel [mm]	– Read only –
d64	Speed level	– Read only –

16 Memory pen

The memory pen is optional (accessories) and is used to store and transfer data:

– **Memory pen-64 (order no. 1400-9753)**

The memory pen can be configured in TROVIS-VIEW. The following functions for the Type 3374 Actuator can be selected:

– Read data from the memory pen
– Write data to the memory pen
– Time-controlled data logging
– Event-triggered data logging

Refer to the operating instructions for TROVIS-VIEW for details on how to configure the memory pen:

▶ EB 6661 EN.

Using the memory pen

1. Open the actuator cover.
2. Insert the memory pen into the serial interface of the actuator.

⇨ The actuator automatically recognizes the memory pen. The dialog for the memory pen appears on the display. The function configured in TROVIS-VIEW is represented by a code on the display (see Table 4).

3. Select the required action using the rotary pushbutton (depending on the function selected. See Table 4).

⇨ ***OK*** appears on the display after data transmission is completed.

4. Remove memory pen after data transmission is completed.

⇨ The memory pen dialog ends. The start screen appears.
Close the actuator cover.

Table 4: *Memory pen dialog*

Code	Function	Action	Text
S02	Read data from memory pen	Read Write	READ WRIT
S03	Write data to memory pen	Write	WRIT
S11	Time-controlled data logging	Data logging in progress	TLOG
S12	Event-triggered data logging	Data logging in progress	ELOG

Table 5: *Memory pen error*

Code	Error	Text
E51	Read error (memory pen)	ERD
E52	Write error (memory pen)	EWR
E53	Plausibility error	EPLA

16.1 Command pen

The following executable commands can be written to the memory pen in TROVIS-VIEW:

– Retract actuator stem

– Extend the actuator stem

These commands turn a memory pen into a command pen. After inserting the command pen into the actuator's interface, all functions running are ended and the command is executed since the command pen has priority over all functions.

Note:

– A command pen remains active as long as it is inserted into the actuator's interface (even after a reset).

– Only one command at a time can be written to the memory pen and executed.

Using the command pen

1. Open the actuator cover.
2. Insert the command pen into the serial interface of the actuator.

⇨ The actuator automatically recognizes the command pen. The dialog for the command pen appears on the display. The function (command) selected in TROVIS-VIEW is represented by a code on the display (see Table 6).

3. Remove command pen after the command has been executed.

⇨ The command pen dialog ends. The start screen appears.
Close the actuator cover.

Table 6: *Command pen dialog*

Code	Command/function	Text
S21	Retract actuator stem	IN
S22	Extend actuator stem	OUT

17 Appendix

17.1 Levels and customer data

17.1.1 Operating level

Code	Parameters	**Select** (select ESC to cancel)	Section
Start screen			
0	Actuator travel	– Read only – [%]	10.1
Operating level			
1	Positioning value	– Read only – [%]	
2	Select the operating mode	AUTO (automatic mode), MAN (manual mode)	12.1
3	Set manual position value	0.0 to 100.0 %	12.1
4	Change reading direction of display	DISP, dSIP	12.2
5	Start initialization	> INI	12.3
6	Application	ACTU (positioner), PID (PID controller), OPEN (two-step mode)	12.5
9	Select key number	> KEY	11
10	Activate the configuration level	> CO	13.1
11	Activate the information level	> INF	14.1
20	Activate the diagnostic level	> DIA	15.1
Fatal error (can only be seen when error exists)			
E01	Error: Input signal failure	FAIL	12.4
E02	Error: Blockage	BLOC	12.4
E03	Error: Both limit switches are active	SWI	12.4
E04	Error: Canceled while retracting stem	SIN	12.4
E05	Error: Canceled while extending stem	SOUT	12.4
EEPROM error (can only be seen when error exists)			
E11	Error: No basic setting	NTRV	12.4
E12	Error: No configuration	NCO	12.4
E13	Error: No calibration	NCAL	12.4
E14	Error: No potentiometer calibration	NPOT	12.4
E15	Error: No transit time	NRUN	12.4

17.1.2 Configuration level

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
Input signal					
c01	Unit	mA (current signal), V (voltage signal)	mA	13.2	
c02	Lower range value	0.0 to 15.0 mA	4.0 mA	13.2	
		0.0 to 7.5 V	2.0 V		
c03	Upper range value	5.0 to 20.0 mA	20.0 mA	13.2	
		2.5 to 10.0 V	10.0 V		
Position feedback signal					
c05	Unit	mA (current signal), V (voltage signal)	mA	13.5	
c06	Lower range value	0.0 to 15.0 mA	4.0 mA	13.5	
		0 to 7.5 V	2.0 V		
c07	Upper range value	5.0 to 20.0 mA	20.0 mA	13.5	
		2.5 to 10.0 V	10.0 V		
Binary input					
c11	Function	NONE (inactive), PRIO (priority position), OPEN (two-step mode), NEXT (next entry in information level), LAMP (backlight activated), MEND (exit manual level for travel adjustment)	NONE	13.6	
c12	Switching state for active function	OFF (binary input switched off), ON (binary input switched on)	ON	13.6	
Binary output					
c15	Function	NONE (inactive), FAIL (error indication), LIM (limit contact), PRIO (priority position), BIN (adopt binary input's state), MAN (show manual mode)	NONE	13.7	
c16	Switching state for active function	OFF (binary output deactivated), ON (binary output activated)	ON	13.7	

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
Electronic limit contact (binary output)					
c21	Message in case of event	NONE (inactive), HIGH (upper limit violation), LOW (lower limit violation)	NONE	13.7	
c22	Switching value	0.0 to 100.0 %	10.0 %	13.7	
c23	Hysteresis	0.0 to 10.0 %	1.0 %	13.7	
Electronic limit contact 1					
c24	Message in case of event	NONE (inactive), HIGH (upper limit violation), LOW (lower limit violation)	NONE	13.8	
c25	Switching value	0.0 to 100.0 %	10.0 %	13.8	
c26	Hysteresis	0.0 to 10.0 %	1.0 %	13.8	
Electronic limit contact 2					
c27	Message	NONE (inactive), HIGH (upper limit violation), LOW (lower limit violation)	NONE	13.8	
c28	Switching value	0.0 to 100.0 %	90.0 %	13.8	
c29	Hysteresis	0.0 to 10.0 %	1.0 %	13.8	
Input signal					
c31	Detect input signal failure	NO, YES	NO	13.2	
c32	Reference value upon input signal failure	INT (internal travel value), LAST (last travel value)	INT	13.2	
c33	Internal travel value	0.0 to 100.0 %	0.0 %	13.2	
c34	Travel for priority position	0.0 to 100.0 %	0.0 %	13.6	
c35	End position guiding: valve open	0.0 to 100.0 %	97.0 %	13.2	
c36	End position guiding: valve closed	0.0 to 49.9 %	1.0 %	13.2	
c37	Position feedback indicates error	YES (error reading active), NO (error reading inactive)	NO	13.5	

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
Operation					
c42	Operating direction	>> (increasing/increasing), <> (increasing/decreasing)	>>	13.3	
c43	Restart	NORM (normal), ZERO (zero calibration), FIX (fixed positioning value), STOP (stop in manual level)	NORM	13.9	
c44	Fixed positioning value on restart	0.0 to 100.0 %	0.0 %	13.9	
Blockage					
c51	Blockage detection	NO (function not activated), YES (function activated)	NO	13.10	
c52	Blockage removal	NO (function not activated), YES (function activated)	NO	13.10	
c53	Blocking protection of valve	NO (function not activated), YES (function activated)	NO	13.10	
Valve travel					
c61	Rated travel	– Read only –	[mm]	13.11	–
c62	Gear version	– Read only –	–	13.11	–
c63	Limited travel range	10.0 to 100.0 %	100.0 %	13.11	
c64	Speed level	NORM (normal), FAST (fast)	NORM	13.11	
c65	Stroking speed	– Read only –	[mm/s]	13.11	–
c66	Transit time	– Read only –	[s]	13.11	–
c67	Dead band (switching range)	0.5 to 5.0 %	2.0 %	13.11	
Characteristic					
c71	Characteristic type	LIN (linear), EQUA (equal percentage), INV (reverse equal percentage), USER (user-defined)	LIN	13.12	
c72	User-defined characteristic	User-defined		13.12	

Code	Parameters	Setting range (select ESC to cancel)	WE	Section	Customer data
PID controller					
c81	Set point	0.0 to 100.0 %	50.0 %	13.6, 12.5	
c82	Proportional-action coefficient Kp	0.1 to 50.0	1.0	12.5	
c83	Reset time Tn	0 to 999 s	20 s	12.5	
c84	Derivative-action time Tv	0 to 999 s	0 s	12.5	
Scaling of positioning value for PID controller					
c85	Unit	NONE (none), PER (%), CEL (°C)	PER		
c86	Lower range value	–999 to 999	0		
c87	Upper range value	–999 to 999	100		
Device					
c91	Customized key number active	NO, YES	NO	11.1	
c92	Customized key number	0000 to 1999	0000	11.1	
c93	Backlight always on	NO, YES	NO	12.2.2	
c95	Interface module and protocol	NONE (without interface board), MOD (RS-485 module), USB (USB module), BLUE (Bluetooth module), TUN (Ethernet tunnel), WEB (Ethernet web)	NONE		

Characteristic level

Code	Parameters	Selection	WE	Section	Customer data
H0	X0	0.0 to 100.0 %	0.0 %	13.12	
Y0	Y0	0.0 to 100.0 %	0.0 %	13.12	
H1	X1	0.0 to 100.0 %	10.0 %	13.12	
Y1	Y1	0.0 to 100.0 %	10.0 %	13.12	
H2	X2	0.0 to 100.0 %	20.0 %	13.12	
Y2	Y2	0.0 to 100.0 %	20.0 %	13.12	
H3	X3	0.0 to 100.0 %	30.0 %	13.12	
Y3	Y3	0.0 to 100.0 %	30.0 %	13.12	
H4	X4	0.0 to 100.0 %	40.0 %	13.12	
Y4	Y4	0.0 to 100.0 %	40.0 %	13.12	
H5	X5	0.0 to 100.0 %	50.0 %	13.12	
Y5	Y5	0.0 to 100.0 %	50.0 %	13.12	
H6	X6	0.0 to 100.0 %	60.0 %	13.12	
Y6	Y6	0.0 to 100.0 %	60.0 %	13.12	
H7	X7	0.0 to 100.0 %	70.0 %	13.12	
Y7	Y7	0.0 to 100.0 %	70.0 %	13.12	
H8	X8	0.0 to 100.0 %	80.0 %	13.12	
Y8	Y8	0.0 to 100.0 %	80.0 %	13.12	
H9	X9	0.0 to 100.0 %	90.0 %	13.12	
Y9	Y9	0.0 to 100.0 %	90.0 %	13.12	
H10	X10	0.0 to 100.0 %	100.0 %	13.12	
Y10	Y10	0.0 to 100.0 %	100.0 %	13.12	
H00	Exit level				

17.1.3 Information level

Code	**Parameters** (read only)	Reading/unit	Section
Input signal			
i01	Lower range value of input signal	[V] or [mA] [1]	13.2
i02	Upper range value of input signal	[V] or [mA] [1]	13.2
i03	Input signal	[%]	13.2
i04	Input signal	[V] or [mA] [1]	13.2
Travel			
i11	Actuator travel	[%]	13.11
i12	Actuator travel	[mm]	13.11
Position feedback signal			
i21	Lower range value of position feedback signal	[V] or [mA] [1]	13.5
i22	Upper range value of position feedback signal	[V] or [mA] [1]	13.5
i23	Position feedback signal	[%]	13.5
i24	Position feedback signal	[V] or [mA] [1]	13.5
Binary signals			
i31	Binary input status	ON/OFF	13.6
i32	Binary output status	ON/OFF	13.7
Limit switch			
i41	Status of limit switch (stem retracted)	ON/OFF	13.2
i42	Status of limit switch (stem extended)	ON/OFF	13.2
Configuration			
i51	Operating direction	>>/<>	13.3
i52	Limited travel range	[%]	13.11
i53	Transit time	[s]	13.11
i54	Application	ACTU/PID/OPEN	12.5
Diagnostics			
i61	Travel cycles	From 10000 onwards, reading in K	
i62	Temperature inside device	[°C]	
i63	Lowest temperature inside device	[°C]	
i64	Highest temperature inside device	[°C]	
i00	Exit information level		

[1] The mA unit is represented in the display by the icon .

17.1.4 Diagnostic level

Code	Parameters	**Display/select** (select ESC to cancel)	Section
Information – Device			
d01	Firmware version	– Read only –	
d02	Revision number	– Read only –	
Errors – Status			
d10	Error during operation	– Read only – YES, NO	
d11	Priority position triggered		
Errors – Fatal errors			
d21	Input signal failure	– Read only – YES, NO	15.2
d22	Blockage		
d23	Both limit switches active		
d24	Canceled while retracting stem		
d25	Canceled while extending stem		
Errors – EEPROM error			
d31	EEPROM error: Basic setting	– Read only – E RD (read error), E WR (write error)	15.2
d32	EEPROM error: Configuration		
d35	EEPROM error: Calibration		
d36	EEPROM error: Potentiometer calibration		
d41	EEPROM error: Serial number		
d42	EEPROM error: Manufacturing parameters		
d43	EEPROM error: Transit time		
d44	EEPROM error: Status messages		
d45	EEPROM error: Statistics		
Test – Actions			
d51	Start zero calibration	ZER	15.3
d52	Start initialization	INI	12.3
d53	Perform reset	RES	15.5
d54	Loading default settings	DEF	15.6
d55	Test the display	TEST (all segments displayed)	15.7

Code	Parameters	**Display/select** (select ESC to cancel)	Section
Test – Transit time			
d61	Start transit time measurement	RUN	15.8
d62	Measured transit time	– Read only – [s]	15.8
d63	Measured travel	– Reading only – [mm]	15.8
d64	Speed level during measurement	– Read only – NORM (normal), FAST (fast)	15.8
Test – long-term test (for servicing purposes only)			
d71	Enable long-term test	CON	
d72	Position for stem extending [1)]	0.0 to 99.0 %	
d73	Position for stem retracting [1)]	1.0 to 100.0 %	
d74	Delay	0 to 255 s	
d00	Exit level	> ESC	

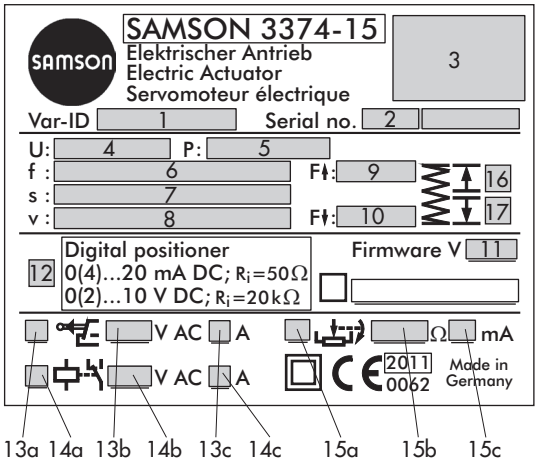
[1)] Applies to operating direction increasing/increasing. Reversed for operating direction increasing/decreasing

Tip:
Other parameters of the diagnostic level can viewed in the TROVIS-VIEW software.

17.1.5 Further codes on the display

Code	Function	State	Text
F11	Zero calibration	Active, select ESC to cancel	ZERO
F12	Initialization	Active, select ESC to cancel	INIT
F13	Transit time measurement	Active, select ESC to cancel	RUN
F14	Long-term test	Active, select ESC to cancel	CON
F41	Blocking protection	Active	BPRO
F42	Blockage removal	Active	BREM
F61	Retract actuator stem in manual level	Active	MIN
F63	Extend actuator stem in manual level	Active	MOUT
F64	Stop actuator stem in manual level	Active	MSTO

17.2 Nameplate



1 Configuration ID (Var.-ID)
2 Serial number
3 Testing according to DIN EN 14597
4 Power supply
5 Power consumption
6 Power line frequency
7 Nominal transit time
8 Stroking speed
9 Thrust (stem retracts)
10 Thrust (stem extends)
11 Firmware version
12 Positioner (yes/no)
13 Mechanical limit contacts
a: Installed/not installed
b: Voltage
c: Current
14 Electronic limit contacts
a: Installed/not installed
b: Voltage
c: Current
15 Resistance transmitter
a: Installed/not installed
b: Resistance
c: Current
16 Fail-safe action (stem retracts)
17 Fail-safe action (stem extends)

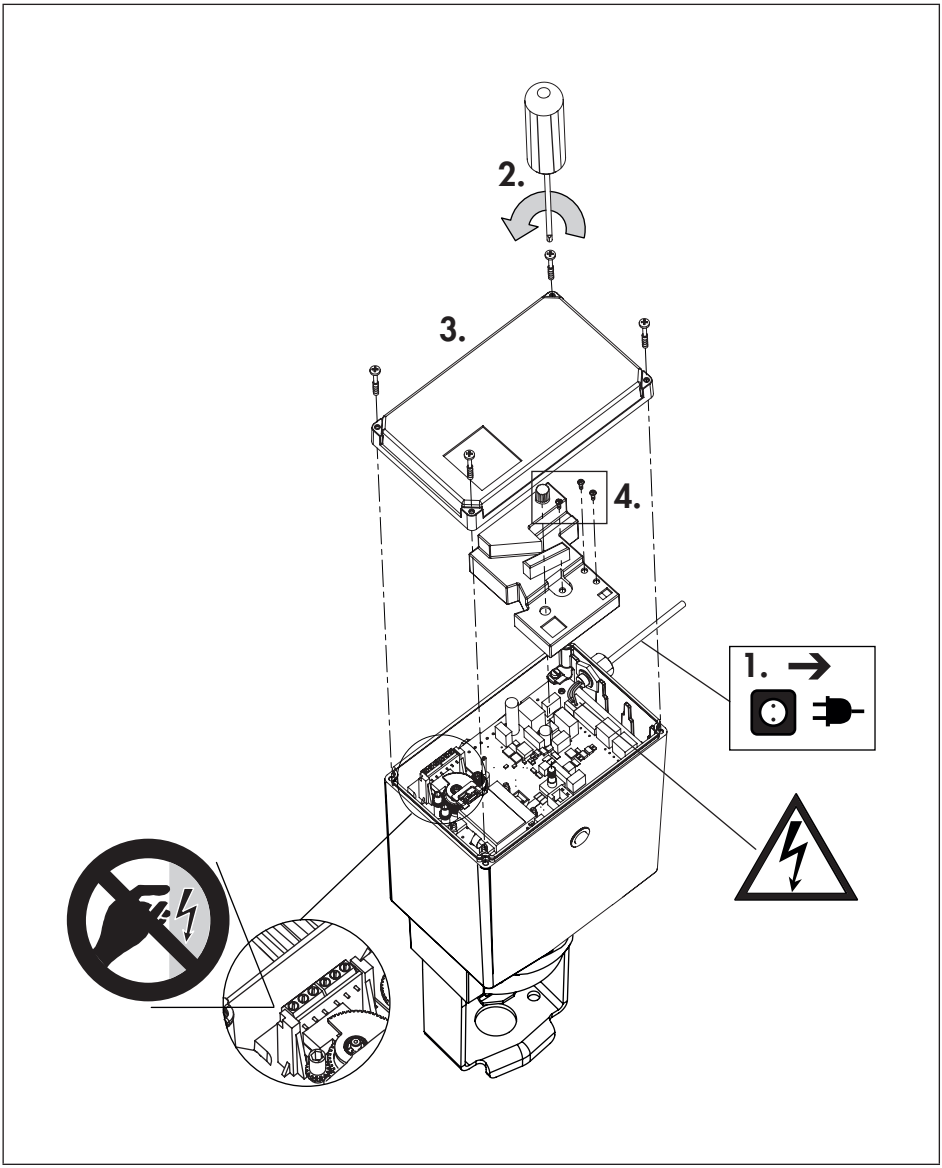
17.3 Customer inquiries

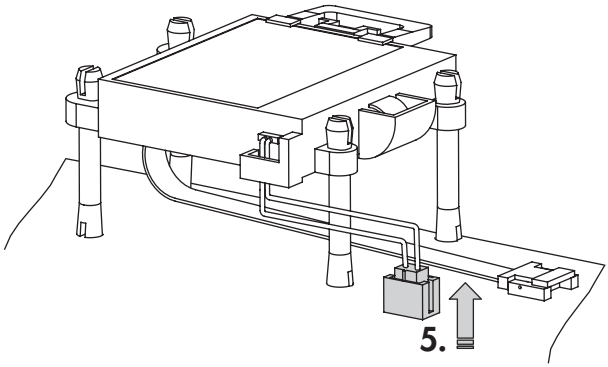
Please submit the following details:

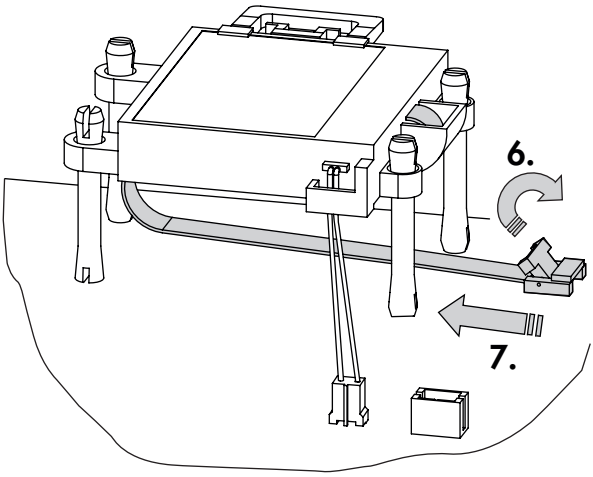
- Type designation
- Configuration ID (Var.-ID)
- Serial no.
- Firmware version

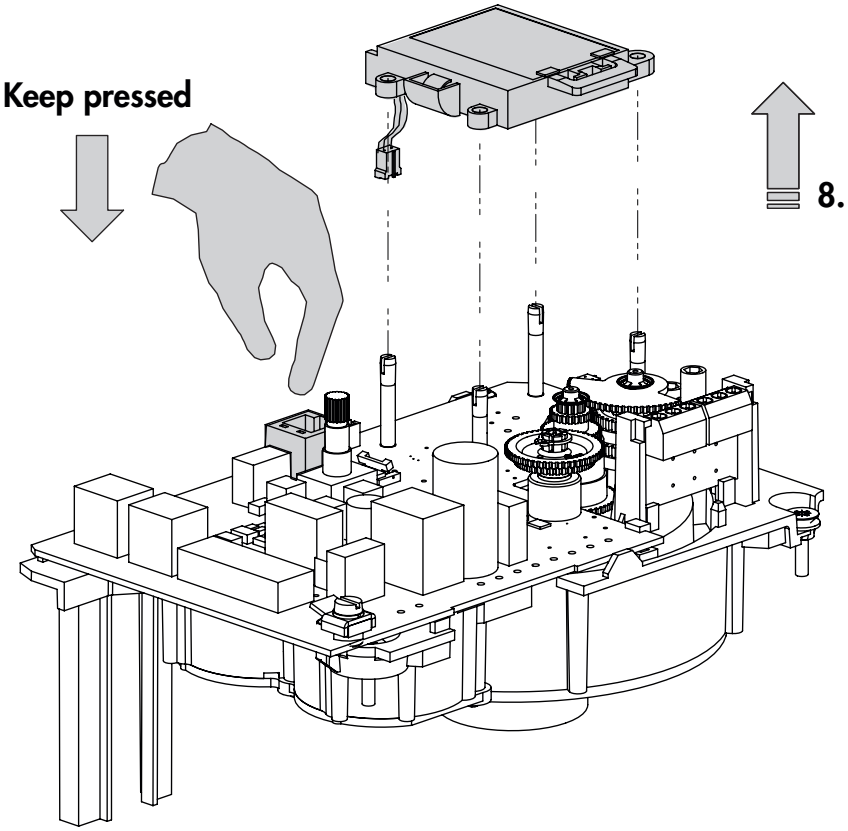
Tip:
Serial number and firmware version can also be read in the TROVIS-VIEW software.

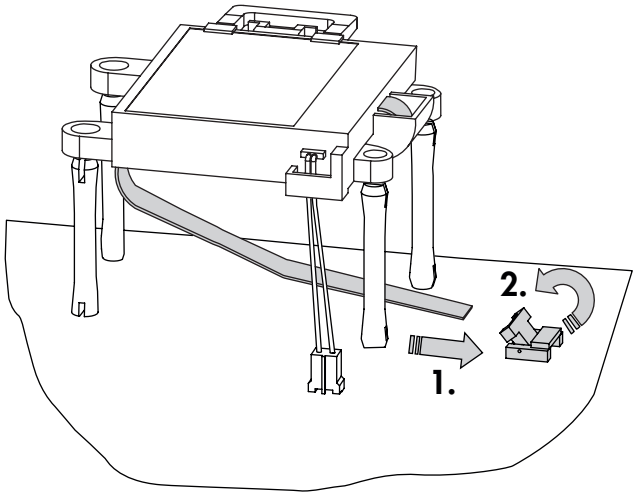
17.4 Replacing the display

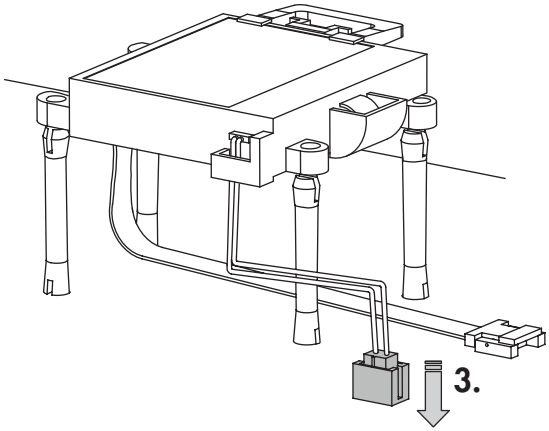


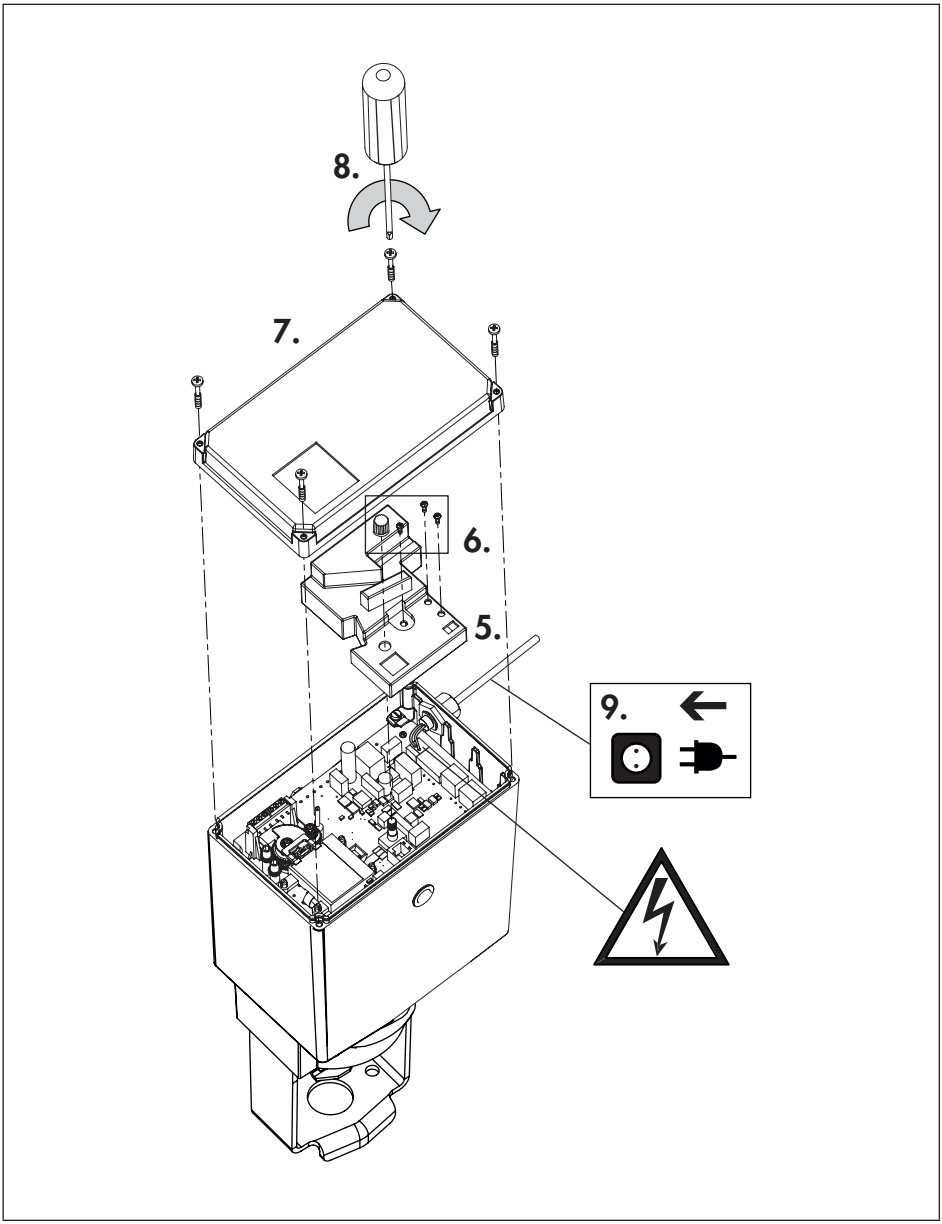

5.


6.
7.


Keep pressed
8.


2.
1.


3.


8.
7.
6.
5.
9.

Index

A

Actuator
- mounting on valve 12
- principle of operation..... 8
- restarting 50
- thrust 9, 10
- versions 8

Actuator stem..... 8, 16, 29, 36, 38

Applications 33

B

Backlight 40

Binary input..... 11, 40

Binary output 41

Blockage 43

C

Characteristic..... 45, 61

Characteristic level 61

Command pen 54

Configuration level 35–50, 57–60
- binary input 40
- binary output..... 41
- blockage..... 43
- characteristic 45
- electronic limit contacts..... 42
- input signal 36–38
- operating direction..... 37
- parameters..... 35
- position feedback signal..... 39
- restart 42
- travel 44

D

Dead band 44

Default settings..... 51

Design..... 8

Diagnostic level..... 48–52, 51, 63–64
- measuring the transit time..... 52
- parameters..... 48
- restarting actuator..... 50
- testing the display 51
- troubleshooting..... 49
- zero calibration 50

Dimensions 21

Display..... 23
- backlight..... 30
- reading direction 30
- replacing 30
- start screen..... 23
- testing..... 51

E

Electrical connections..... 15

End position guiding..... 38

Errors..... 32

F

Fail-safe action..... 8, 10

I

Information level 47, 62

Initialization..... 31

Input signal..... 36–38

Installation 12

K

Key number 27–28

L

Limit contacts 8, 12
- electronic 42
- mechanical 17–20

M

Manual level 40

Manual override 16

Memory pen 53

Menu control 25

N

Nameplate 65

O

Operating controls 22

Operating direction 37

Operating level 29–31, 56
- adapting the display 30
- initialization 31
- selecting operating mode 29

Operating mode 29

P

PID controller 33, 60

Positioner 33

Position feedback signal 39

Priority position 40, 41

R

Restart 42

Restarting actuator 50

Rotary pushbutton 25

S

Safety instructions 7

Serial interface 26

Speed level 44

Start screen 23

Start-up 16

T

Technical data 9–12, 21

Testing according to DIN EN 14597 8

Transit time 44, 52

Travel 44

Troubleshooting 49

Two-step mode 34, 40

Z

Zero calibration 42, 50

Service key number	**1732**

SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
samson@samson.de · www.samson.de

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